SUBJECT: NPIC Image Enhancement Potential

Before we can consistently enhance images, we need to know the various properties of the image that contribute to its perceptibility, the degree of significance of each and the interrelationships between these properties. In most of the so-called "image enhancement" techniques known today some properties are improved at the expense of others--almost always resulting in a net loss of information. Accordingly, we are concerned about the utility of many of the so-called "image enhancement" techniques.

The entire imagery exploitation community including NPIC is still looking for a system to define and evaluate the properties of images that make them more perceptible and/or interpretable. In short, to our knowledge, there are no established criteria for "enhancing" imagery that will improve its interpretability--apart from the utilization of the best techniques available for high-fidelity duplication of the information captured in the original negative In fact, most of the so-called "enhancement" techniques have been shown to result in a net loss of information

To be sure, there is hope of improving the interpretability of an image which has been degraded by any one or a combination of several factors This, of course, is the objective of the RED Image Manipulation Program, but these techniques are certainly not available for routine operational utilization at this time. Appropriate RED personnel would be glad to brief APSD on the extent, objectives, and status of this program in order to insure full coordination and maximum capability for the APSD production-oriented effort

c Ref. Attachment, Para II.8. and 9. The status of the techniques and facilities cited in both these paragraphs is such that only special high-priority experimental jobs can be attempted They are not suited to routine production of "enhanced" imagery.

3. Discussion. The following remarks will be addressed to matters cited in Section III, Discussion, in the reference attachment

a. (III 3 ) The need for a (routine) production capability in image enhancement support is valid APSD is certainly an appropriate component to furnish the leadership for providing this service. However, we would caution against accepting responsibility to augment the [redacted] reproduction function in a way that would relieve them of the responsibility for maintaining high-fidelity reproduction standards and rigorous quality control--in other words we recommend that these image enhancement services be limited to cases which are not feasible for the [redacted] reproduction capability It also appears that the PSG/RD/PSB should be brought

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to a level of capability whereby it would be able to perform the more routine services of this type, such as contrast modifications, density cuts, and logetronic prints.

b. (III.5.). We are not aware of any image enhancement techniques that are available for production services which will provide as much information from a 2nd or 3rd generation dupe negative as will be obtained from the careful high-quality d ping from the OH without any enhancement.

c. (III.6.). This paragraph should be viewed in the light of our present limited knowledge of what actually achieves a net improvement in the interpretability of imagery and a more careful assessment of when such enhancement is economically feasible and operationally significant.

d. (III.10.). The plan for APSD to produce a handbook is excellent, but such a handbook should be carefully edited so as not to unintentionally imply "improvements" to the imagery that may actually reduce the information contained in it. Many enhancement techniques are displayed on low resolution imagery in such a way that this information loss is not apparent.

4. Recommendations. The following remarks will be addressed to Section IV, Recommendations, in the reference attachment.

a. (IV a.). Generally concur. Suggest changing to, Management designate APSD to be responsible for providing leadership and coordination for production-oriented imagery enhancement required to support NPIC exploitation operations.

b. (IV b.). Defer until local coordination is achieved.

c. (IV c.). This should be done as a joint activity in coordination with the R&D CCB observer with appropriate correlation to our R&D program in this area.

d. (IV d.). Much work remains to be done in this area Definition of the image perceptibility characteristics is the most significant missing foundation data. The justification of the cost of such an extensive R&D program may be difficult.

e. (IV e & f). R&D/ATB/EL will be glad to provide laboratory assistance and to work together with APSD personnel in this effort when feasible, but this is obviously not a practical arrangement for general production oriented activity.

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RED suggests that it may be appropriate for APSD to establish a laboratory capability to perform this function and/or make special laboratory facilities available in the PSG/RD/PSD.

5. RED would again like to express its support for the general proposal made by APSD in the reference--with the cautions noted above. Within the general limits we have cited, we stand ready to cooperate with APSD in establishing a first-rate production-oriented imagery enhancement capability at NPIC.

6 Preparation of this memorandum has been coordinated with Messrs.

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Special Assistant for Plans & Applications, RED

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